LETTERS TO THE EDITOR.

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Kites and Wireless Telegraphy.

IN view of the current report in the daily Press that Mr. Marconi has succeeded in receiving at St. John's, Newfoundland, by means of a wire raised with a kite, signals sent from his station at Poldhu, Cornwall, it may be interesting to recall that kites were used here during the summer of 1899 in some similar experiments. In the "Report of S. P. Langley, Secretary of the Smithsonian Institution, for the Year ending June 30, 1900," it is stated on p. 10: "In addition to the above investigations a Hodgkins grant has been approved to enable Mr. Rotch to carry on a series of experiments in space telegraphy, it being thought that the unprecedented heights attained by kites might materially extend the range of communication by this method. In the preliminary experiments, however, kites were not used, sufficient elevation being attainable without them, but when the difference between the stations was increased from one mile to three, kites were employed to raise the transmitting and receiving wires. In the later experiments it was found, not unexpectedly, that the long wires, carried up and supported by kites, collected so much electricity as to interfere with and greatly complicate the messages sent from station to station. These interruptions seem to show that the limit of elevation for the receiving wire was under these conditions less than five hundred feet. The greatest distance covered in the experiments was approximately twelve miles, from a wire supported by a kite about two hundred feet above Blue Hill to the tower of Memorial Hall in Cambridge, which was used as the receiving station. These experiments draw attention to the fact that electrification increases with the altitude to which the wire is carried, and that it is always present, although varying with the meteorological condition of the atmosphere. The experiments were discontinued in the autumn of 1899."

If Mr. Marconi, by his system, has really received signals from across the Atlantic, with the receiving wire lifted by a kite to an altitude exceeding five hundred feet, it would appear from my experiments that he must have employed some hitherto unknown method of shunting out atmospheric electricity.

A. LAWRENCE ROTCH.

Blue Hill Meteorological Observatory,
Mass, U.S.A., December 17, 1901.

Poisonous Molluscs.

I NOTICE that doubt is cast on the opinion held by some authorities that the bite of certain species of Conus is poisonous; and as a case has now occurred here in a European subject whose intelligence places her account of it beyond question, I think it may be useful to represent the corroborative evidence thus obtained.

I should mention, first, that a shell exactly similar to the one in question was forwarded to the Australian Museum, Sydney, and that I am indebted to Mr. Etheridge, the curator, for information on the point and for the identification of the specimen as the shell of *Conus geographicus*.

The patient, Mrs. B., was fishing from a boat after dark in the harbour of Levuka (Fiji), and one of the crew handed her a mollusc he had picked up in shallow water at low tide while getting bait—a *C. geographicus*. Mrs. B., being an old resident in the islands, proceeded to evulse the mollusc with her little finger, the boy having cracked the shell to facilitate this procedure. While doing so she received a puncture, and shortly afterwards felt her hand and fore-arm becoming numb. The effect quickly extended to the shoulder, and the patient had to return to the shore and be conveyed home. In an hour or so she was in great distress, speechless, and paralysed in most of the voluntary muscles; a condition which later became intensified and alarming, although the cardiac and respiratory muscles showed no evidence of flagging. The medical man who attended Mrs. B. likened her condition to that which might be looked for after poisoning by *curare*.

The puncture was so slight as to be scarcely discernible; after two days a steady but slow recovery took place, and a fatal termination was averted.

During this time the patient did not lose consciousness; but there was for a while some confusion of ideas, and, chiefly in consequence of the loss of power in the muscles concerned in articulation, she was unable to speak intelligibly, although she subsequently asserted that she knew quite well what was going on around her. She underwent an attack of conjunctivitis a few days later, which she connects with the occurrence; but it is doubtful whether she is right or not in so believing.

R. GLANVILL CORNEY.

Medical Department, Fiji, September 30, 1901.

The Distance of Nova Persei.

IT appears to me that the phenomenon of the apparent expansion of the nebula surrounding Nova Persei would be simply explained by referring it to the illumination of meteoric matter by the light sent out on the occasion of the outburst of the Nova. On this hypothesis it becomes possible to calculate the distance from the earth by means of the observed angular growth of the illuminated ring which must spread out with the velocity of light. This gives 313 light-years as the distance.

Daramona. W. E. WILSON.

Colours of Butterflies not due to Diffraction.

SOME time ago your correspondent, Mr. Benham, corrected the mistake that mother-of-pearl owes its beauty to diffracted light. The error had lived long, partly, perhaps, because it came from an authority so eminent as Sir David Brewster.

A similar idea seems to be still prevalent, that butterflies and moths derive their colours from diffraction. Two of the best modern natural histories, which I have at hand, favour the supposition.

The patches on the wing are groups of uniformly coloured scales, which contain pigment. Diffraction colours are of a different character; they are many-coloured iridescent lights varying as they glance off at different angles. The distinction is familiar to a worker in optics; it is easy for anyone to appreciate it by seeing recognised forms of diffraction. I have lately examined a collection of British Lepidoptera, and found no specimens which were coloured by wave interference. The Purple Emperor has two uniform colours, grey and purple, so arranged that there is a direction of vision favourable for seeing each colour. Shot silks and Labrador spar are cases somewhat similar. I have before me a foreign Thecla which has a brilliant light-blue pigment; perhaps in this and some others a certain shimmer is added by a slight diffraction interference, but the predominant effect is the blue colouring matter.

It is, however, interesting to note that all scales have fine diffraction rulings. These lines, as in the case of diatoms, consist of rows of small spots. I have had a wing of the Small Tortoiseshell for about twenty years; the scales are complete, but the colours are faint, and the wing is partly transparent. It is possible to arrange this with care in a strong light so that brilliant rainbow lights are seen, but they are not the familiar tortoiseshell pattern. This effect does not seem to be possible with a fresh wing, so that I doubt whether butterflies are often seen to act as diffraction gratings. No doubt some insects show interference colours, but these seem usually to arise from the phenomenon caused by thin plates. Diffraction can be well studied in humming-birds; there are the brilliant, ever-varying lights, and the fine markings on the feathers may be seen with a microscope. No iridescence is more delicate than that on the side of a fresh mackerel. I am not quite sure to which class of wave interference this is due. W. B. CROFT.

Winchester College, December 30, 1901.

The Quadrantid Meteors.

NOT the least important of our annual star showers are the Quadrantids, so called from the position of their radiant in the constellation of Quadrans Muralis, which is situated between Boötes and Draco. This meteor-system

has not had the same attention lavished on it as has been given to the more historic epochs of the Leonids, Lyrids and Perseids. Yet occasionally, even when only moderately active, the Quadrantid Radiant furnishes displays of about 40 meteors per hour. In the year 1839 Herrick drew attention to the recurring character of a meteor shower on January 2. A stimulus was given in the same direction when in 1839 Quetelet published his valuable contribution to me teoric literature in his "Catalogue des Principales Apparitions d'Etoiles Filantes," in which were cited two instances when meteors were reported to have been unusually numerous on the morning of January 2, viz. in 1835 and 1838. There was also a previous account of the appearance of an extraordinary bolide in the north of Italy in the year 1825, on the morning of January 2 at 5 o'clock, before and after which hour on that night there was noticed a great abundance of meteors.

When Quetelet published a second edition of his work a few years later it contained notices of Quadrantid displays on the same day of the month in the intervening years 1839 and 1840. Their observation in those years, however, may have been due to their having been specially looked for. The next notable display occurred in 1862, and was accidentally witnessed on the morning of January 2, between about 4 and 5 o'clock, by a lady residing in Harford, Connecticut, U.S., who on this occasion seems to have had the honour of being the sole observer of the apparition. Her attention was attracted by a luminous cloud moving from west to east, and also by the appearance of fine meteors at the rate of about three per minute. Two years later there occurred another display in England, on the night, however, instead of the morning of January 2, for which an organised watch had been kept. Profs. Herschel and Gregg (British Association Report, 1864, p. 30) each observed fifty shooting stars from different stations during the hours 10 to 12 p.m. and 10 to 1 respectively, while another observer, Mr. W. H. Wood, reckoned that the Quadrantids were appearing at the rate of one per minute during the hours 12 to 2. Prof Kirkwood, who instituted researches respecting the periodicity of these meteors and also of other meteor-systems, showed in a paper read before the American Philosophical Society in 1873 that the Quadrantid maximum recurred every thirteen years, the principal displays having taken place in 1825, 1838 and 1864. The intervening maximum between the two last dates is supposed, of course, to have passed unnoticed.

The expected shower, however, in 1877 was looked for in vain owing to unfavourable weather, but on the morning of January 2 in the following year, during a brief interval of clear sky beginning at 4 o'clock, Prof. Herschel noted the appearance of seventeen Quadrantids, nearly half of which ranged in brightness from the brilliancy of Sirius to that of second magnitude stars. Weaker apparitions from the Quadrantid radiant also occurred on the nights of January 2 in the years 1872 and 1873, but seem to have been only partially or imperfectly observed. The circumstance that the principal appearances of these meteors evidently took place in 1825, 1838, 1862 and 1864, and (probably) also in 1878 naturally leads to the expectation that another fine display may be observed in 1902. An examination of the dates at which the first three of these showers occurred shows that the Quadrantid meteoric epoch is gradually, as in the case of other well-known star showers, advancing into the year. The advance takes place on the average, however, and is not very noticeable over short periods, being warped by fluctuations in the date of the shower's appearance with respect to the mean date, such fluctuations being produced by the perturbations which occur in the meteoric orbit.

The display in America in the year 1862 and also those on the night of January 2 in 1872 and 1873 illustrate this advance. A calculation made by the writer with such data as the above displays afford shows that the time of the next shower's expected appearance falls on the night of January 4 in 1902, the maximum or centre of the display being due at 3h. 30m. on the morning of the 5th. Earlier in the night, shortly after 12 o'clock, meteors will probably be unusually numerous. The display in 1864 evidently did not attain the brilliancy of the previous displays. Calculation shows that the maximum of this shower occurred about 10 p.m. on the night of January 2, which prevented the shower being fully observed. Probably some early Quadrantids of the expected display will appear on the morning and also early on the night of January 3. The lateness of the maximum on the night of January 4 is more apparent than real, owing to 1900 not being a leap year. JOHN R. HENRY.

Frost Patterns in Mud

ON many occasions recently frost patterns in mud have been exceptionally well marked, similar to those formerly described by Prof. Bonney and others (see NATURE, vol. lxiii. p. 347; *Proc.* Roy. Soc, vol. lxii. p. 217).

On December 15 several of the usual forms were to be seen, the patterns generally being rather coarse, but elaborate, having branched and curving axes.

Thus, (1) on many ordinary flagstones the ice-fronds spread from the centre outwards, over a patch, roughly oval on an oblong stone, roughly circular on a square one, leaving bare a space towards the edge; although sometimes radial or branched forms started from the edge in addition. (2) The centre of the pattern on some flagstones was occupied by a lumpy mass. This consisted of frozen mud, sometimes having a border two to three inches wide formed of scattered separate lumps. (3) One example, however, was rather exceptional. On a concrete path in St. James's Park a space of a few square yards was broken into patches (from a few inches to 2 feet or more in diameter) with outlines roughly hexagonal or partly curved, resembling the ends of basalt columns. In these patches the branching frost-fronds had spread from the centre outwards, while, between the patches, a space about $\frac{1}{2}$ inch broad was clear of ice. This example reminded me of the spheroids with attempts at spherulitic or variolitic structure in various igneous rocks (see *Q.J.G.S.* vol. xlix. p. 155); and here also one asks whether the contraction which caused such jointing was favourable to crystallisation, or did the crystallisation from a centre cause the contraction, or were the two independent though they cooperated to produce the general result?

CATHERINE A. RAISIN.

THE ROYAL COMMISSION ON COAL RESOURCES.

THE announcement that a Royal Commission has been appointed to inquire into the coal resources of the United Kingdom had not been anticipated by public opinion. Yet, in view of the articles on the subject published in NATURE (1897, p. 389, and 1900, p. 124), it should hardly give occasion for surprise. The duration of the British coal supplies is a question that has lost none of its interest since the previous exhaustive inquiry conducted in 1866–1871 by the Royal Commission of which the late Duke of Argyll was chairman. The fifteen Royal Commissioners—all of whom, with one exception, have now passed away—were among the most eminent men of their day, and their calculations were carried out in a thorough and complete manner. In the course of thirty years, however, unexpected changes have taken place in the coal trade. The annual output of coal in the United Kingdom thirty years ago was not more than 100,000,000 tons; it now exceeds 225,000,000 tons, and the process of exhaustion still continues. The beginning of the twentieth century is evidently an opportune time for taking stock of the national resources of the mineral on which so much of the prosperity of the country depends. The new inquiry is to be of a far-reaching character. The terms of reference are as follows:—

To inquire into—(1) The extent and available resources of the coalfields of the United Kingdom; (2) the rate of exhaustion which may be anticipated, having regard to possible economies in use by the substitution of other fuel or the adoption of other kinds of power; (3) the effect of our export of coal on the home supply and the time for which that supply, especially of the more valuable kinds of coal, will probably be available to British consumers, including the Royal Navy, at a cost which would not be detrimental to the general welfare; (4) the possibility of a reduction in that cost by cheaper transport, or by the avoidance of unnecessary waste in working through the adoption of better methods and improved appliances, or through a change in the customary term and provisions of mineral leases; and